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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/997,751	11/28/2001	Nicholas F. Borrelli	SP01-323	3699

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EXAMINER	
ANGEBRANNDT, MARTIN J	

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/997,751	BORRELLI ET AL.	
	Examiner	Art Unit	
	Martin J Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) *18,19,30,31,39 and 40* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17,20-29,32-38 and 41-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The response of the applicant has been read and given careful consideration. No responses to the arguments of the applicant are presented as the basis for the rejection is upon new art. Rejections of the previous office action not repeated below are withdrawn based upon the amendment to the claims.

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims I-17,20-29,32-38 and 41-48, drawn to making a waveguide using two passes of a femtosecond laser, classified in class 430, subclass 321.

II. ClaimI8,I9,30,31,39 and 40, drawn to a waveguide with an enlarged dimension, classified in class 385, subclass 132.

The inventions are distinct, each from the other because of the following reasons:

3. Inventions group I and group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the method may be used to form grooves or channels by removing material and/or the waveguide may be made using a single laser pass or a selective deposition during formation of the substrate.

4. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and their recognized divergent subject matter, restriction for examination purposes as indicated is proper.During a telephone conversation with Timothy M. Schaeberle (34,424) on August 25, 2003 a provisional election was made without traverse to prosecute the invention of group I, claims 1-I7,20-38 and 4I-48.

Affirmation of this election must be made by applicant in replying to this Office action. Claim18,19,39 and 40 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

6. Applicant's election of group I in Paper No. 12/05/2003 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Claims 18,19,30,31,39 and 40 are withdrawn.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8 Claims 1-13,16-17,20-29,32,36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan et al. 2003/0035640.

Dugan et al. 2003/0035640 disclose an invention similar to that claimed where ultrashort laser pulses are used to form waveguides. These include lasers with pulse widths of less than 100 fs and powers in the nJ or microJoule range. [0034]. The use of these techniques in

trimming by exposure either within or adjacent to waveguides and in either transverse or axial directions is disclosed. [0037]. The pulses are preferably at a wavelength at which the material is transparent [0038] and multiphoton is disclosed as causing the changes in the absorption profile. [0040]. The movement of the confocal volume of the beams during exposure either axially or longitudinally to expose the desired volume using translational stages, shifting of the focus and computer control is disclosed [0042-0045]. The use of translation of the beam s to form transitions between circular and square waveguiding portion is disclosed. [0071]. The repeated scanning of areas is taught throughout (see eg [0082].)

It would have been obvious to one skilled in the art to use the processes of overlapping the confocal volume of the ultrashort laser pulses with axial or longitudinal and/or focal movement to expose the desired cross section and form the waveguides disclosed with the lasers having the disclosed preferred pulse lengths of less than 100 fs and emitting at 800 nm with substrate which are transparent at that wavelength, such as the lead glass based upon the disclosure of these as preferences.

9 Claims 1-17,20-29 and 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan et al. 2003/0035640, in view of Dunsky et al. '363.

Dunsky et al. '363 teach using a spiral path to form a circular pattern by nibbling the edge to achieve the final desired shape (14/51-65).

It would have been obvious to one of ordinary skill in the art to modify the teachings Dugan et al. 2003/0035640 by using the overlapping laser technique disclosed by Dunsky et al. '363 with a reasonable expectation of achieving being able to form more precise circular cross sections in the waveguides.

10 Claims 1-13,16-17,20-29,32,36-38 and 41-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan et al. 2003/0035640, in view of Troitski '486.

Troitski '486 teaches with respect to figure 8 the splitting of a laser beam into several beams and the use of it to damage the inside of a transparent substrate to provide finer conrol over the volume of the damaged area. These include laser etching glasses (6/6) and the formation of ellipse patterns (see figure 7 and 7/10-20)

It would have been obvious to one skilled in the art to modify the process of modify the teachings Dugan et al. 2003/0035640 by using the overlapping multiple laser beams disclosed by Troitski '486 with a reasonable expectation of achieving being able to form more precise circular cross sections in the waveguides.

11 Claims 41-44 and 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over **either** Hirao et al., "Writing Waveguides and Gratings in Silica and Related Materials by a Femtosecond Laser", J. Non-Crystal. Sol., Vol. 239 pp 91-95 (1998), Davis et al. "Writing Waveguides in Glass with a Femtosecond Laser", Opt. Lett., Vol. 21(21) pp 1729-171731 (1996) or the Presentation by Hirao, K. at the First International Symposium on Laser Precision Microfabrication, (Omiya, Saitama, Japan 06/2000) as reported in Hirao, K, "Internal Modification of Glass Materials with a Femptosecond Laser", Proc. SPIE, Vol. 4088 pp 33-39 (2000), in view of Troitski '797.

Hirao et al., "Writing Waveguides and Gratings in Silica and Related Materials by a Femtosecond Laser", J. Non-Crystal. Sol., Vol. 239 pp 91-95 (1998) describes the use of multiphoton processes to form a crossed waveguide in a glass substrate shown in figure 1. The laser pulses are 120 fs. (page 92).

Davis et al. "Writing Waveguides in Glass with a Femtosecond Laser", Opt. Lett., Vol. 21(21) pp 1729-171731 (1996) describes the use of multiphoton processes to form a crossed waveguide in a glass substrate shown in figure 1. The laser pulses are 120 fs. (page 92).

Hirao, K., "Internal Modification of Glass Materials with a Femptosecond Laser", Proc. SPIE, Vol. 4088 pp 33-39 (2000) describes the use of multiphoton processes to form a crossed waveguide in a glass substrate shown in figure 1.

Troitski '797 teaches with respect to figures 25-28, the use of two laser beams, which are orthogonal to each other to etch transparent substrates. The use of multiple beams is disclosed as improving the optical characteristics of the product (4/55-60). The formation of etch points in alignment in adjacent areas is disclosed. (9/64-10/17).

It would have been obvious to one skilled in the art to modify the processes of **either** Hirao et al., "Writing Waveguides and Gratings in Silica and Related Materials by a Femtosecond Laser", J. Non-Crystal. Sol., Vol. 239 pp 91-95 (1998), Davis et al. "Writing Waveguides in Glass with a Femtosecond Laser", Opt. Lett., Vol. 21(21) pp 1729-171731 (1996) or the Presentation by Hirao, K. at the First International Symposium on Laser Precision Microfabrication, (Omiya, Saitama, Japan 06/2000) as reported in Hirao, K, "Internal Modification of Glass Materials with a Femptosecond Laser", Proc. SPIE, Vol. 4088 pp 33-39 (2000) by using two crossed beams as discussed by Troitski '797, particularly in view of figure 25 to form the crossed waveguides in a shorter period of time due to the use of two beams.

With respect to the remarks concerning the use of multiple beams as set forth in claims 41-48. This new rejection meets this limitation.

12 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Martin J Angebranndt
Primary Examiner
Art Unit 1756